

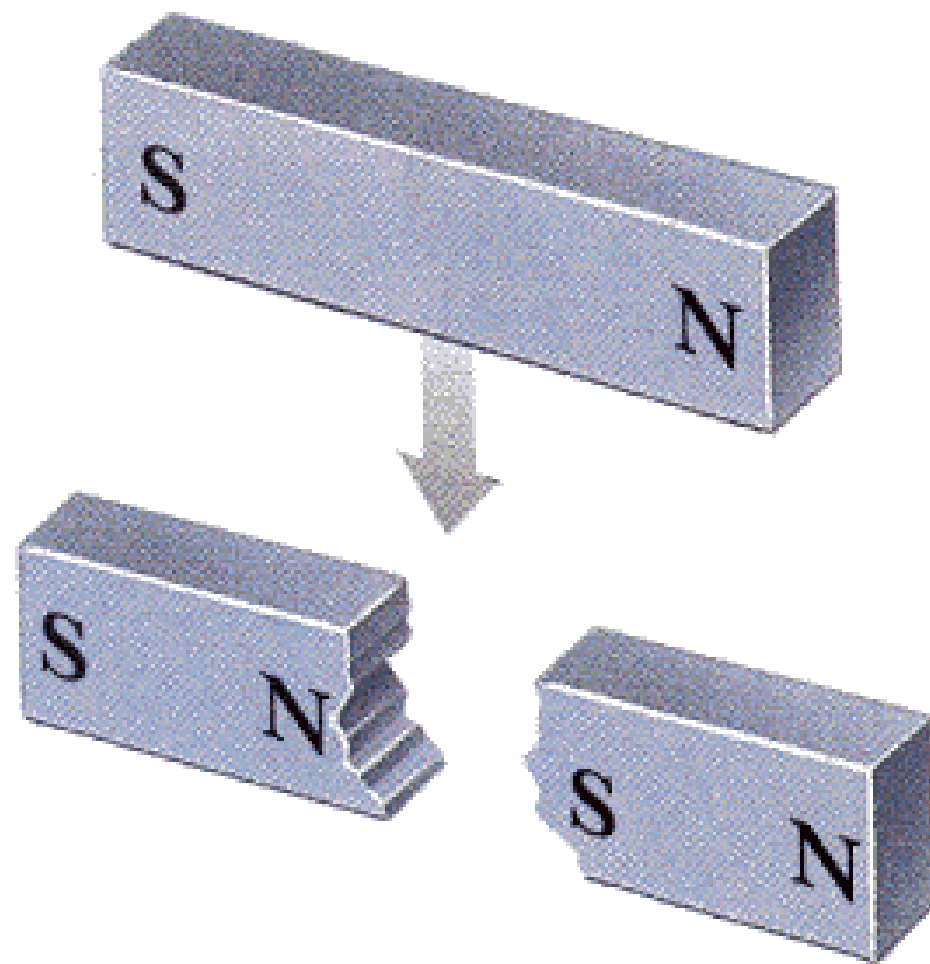
Cutnell & Johnson

**Wiley Publishing**

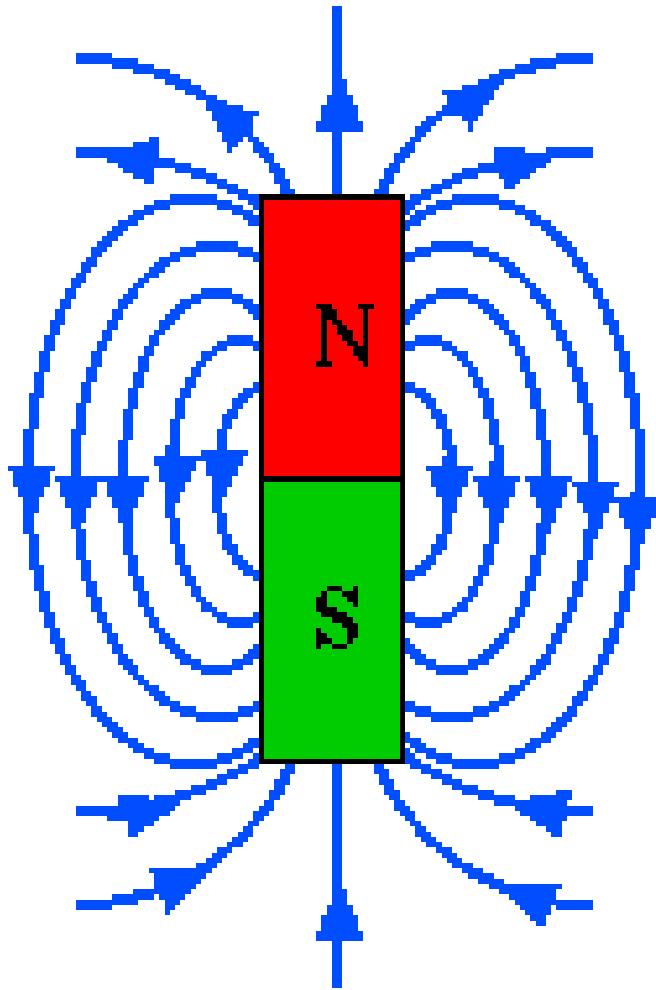
*Physics 5th Ed.*

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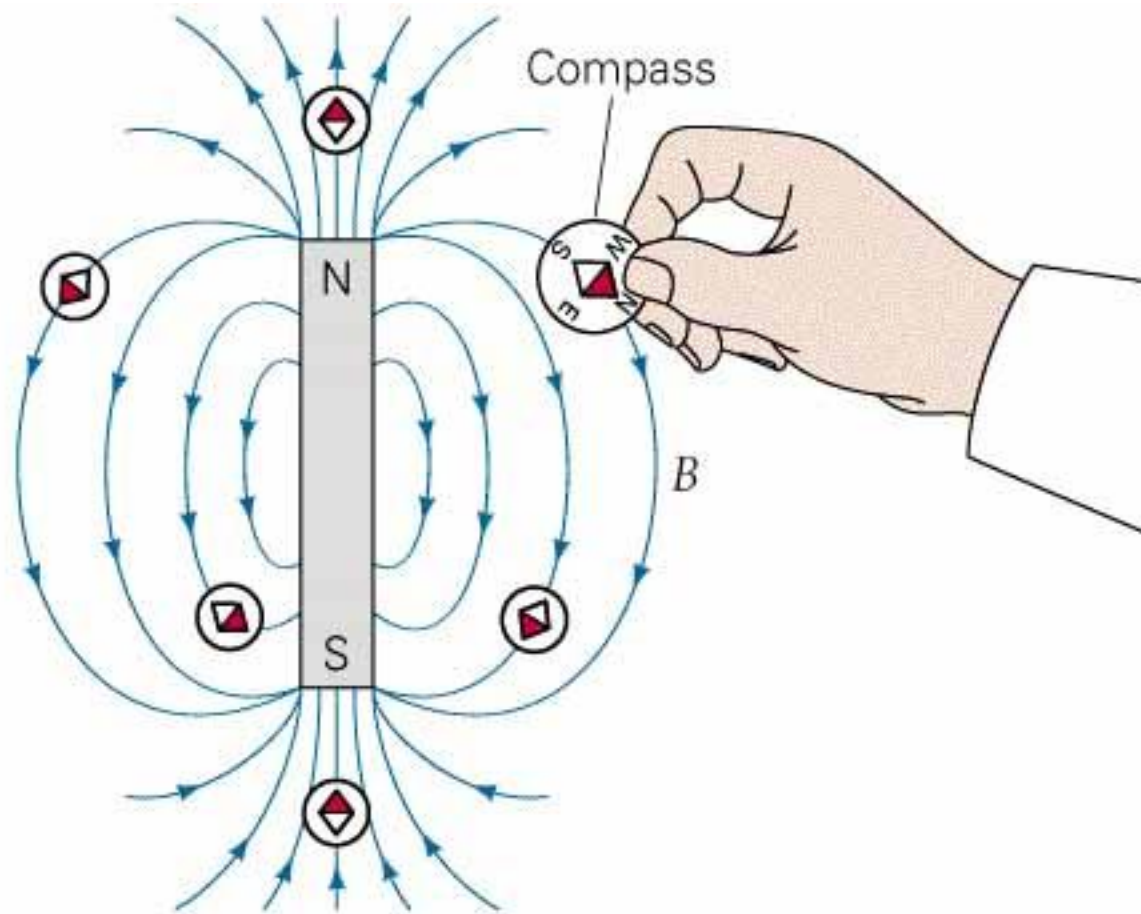


# Magnetic Field Lines



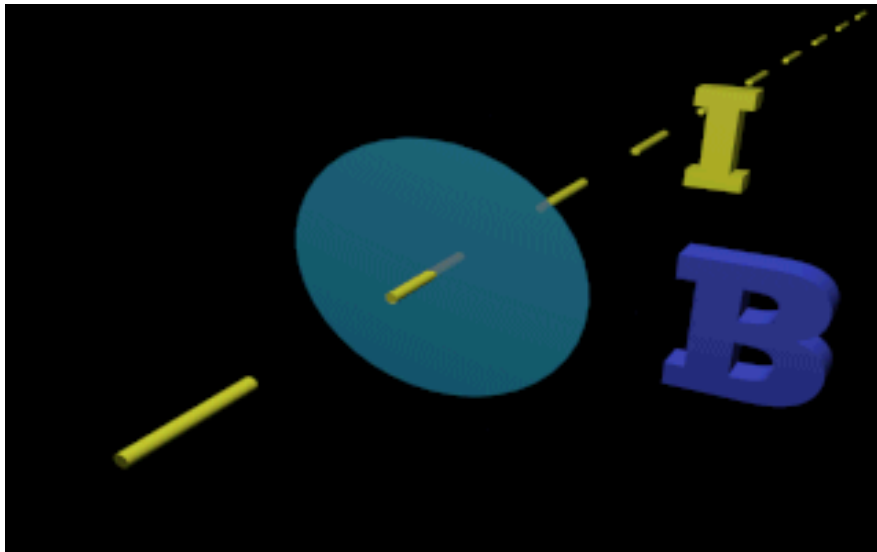
a. point the way a  
compass points.

b. point out of the \_\_\_\_\_  
and into the \_\_\_\_\_.



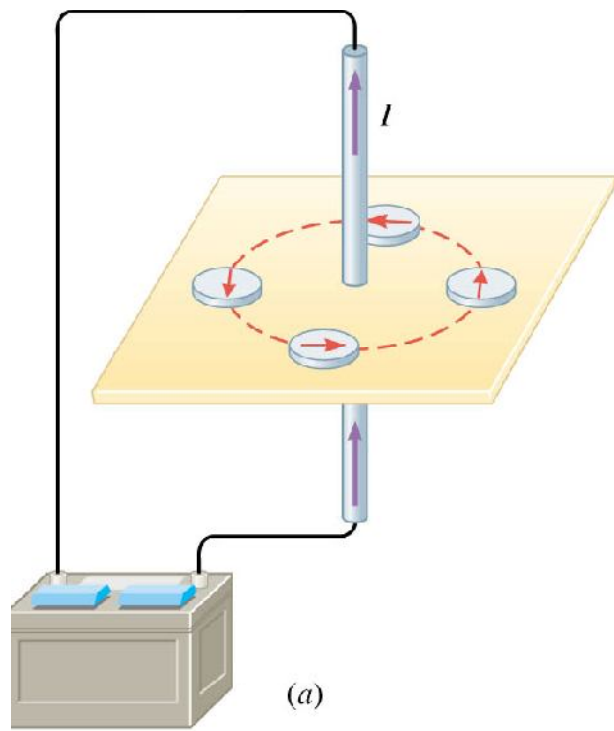
(a)

# Field around a Straight Conductor

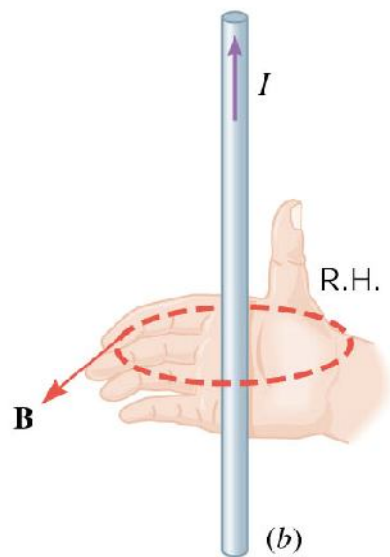


- The magnetic field points in the direction your fingers point if you point your thumb in the direction of the current flow.

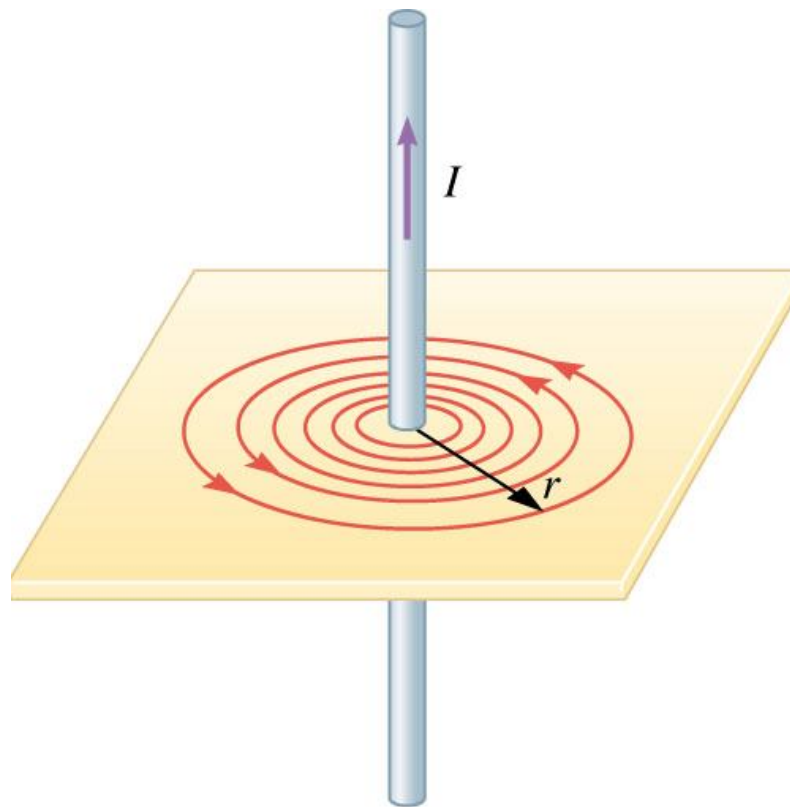
For negative charge use left hand,  
for + charge (AP B “conventional  
current) use right hand



(a)



(b)





Imaginary lines of force around a magnet are  
called  
**Magnetic Flux lines**

Magnetic flux is given the symbol

$\phi$

And is measured in

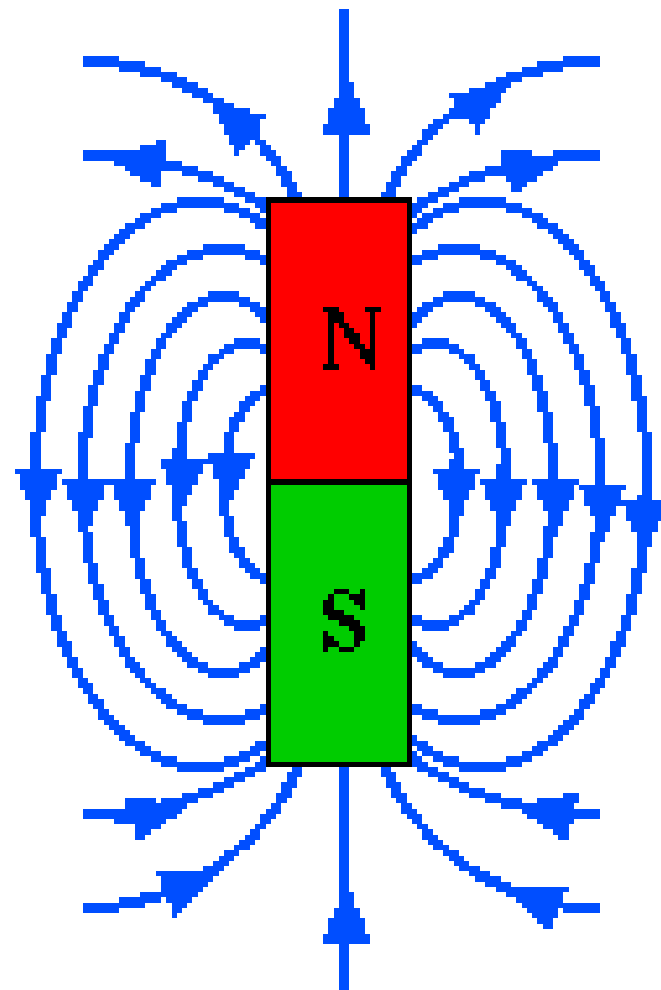
# Magnetic Flux

Magnetic flux is given the symbol

And is measured in

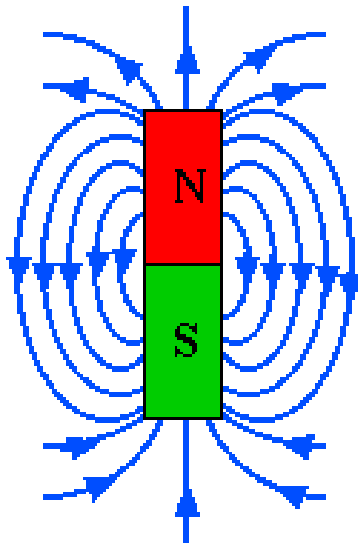
$\phi$

Each drawn field  
line represents 1  
Weber of flux on  
a Regents exam.

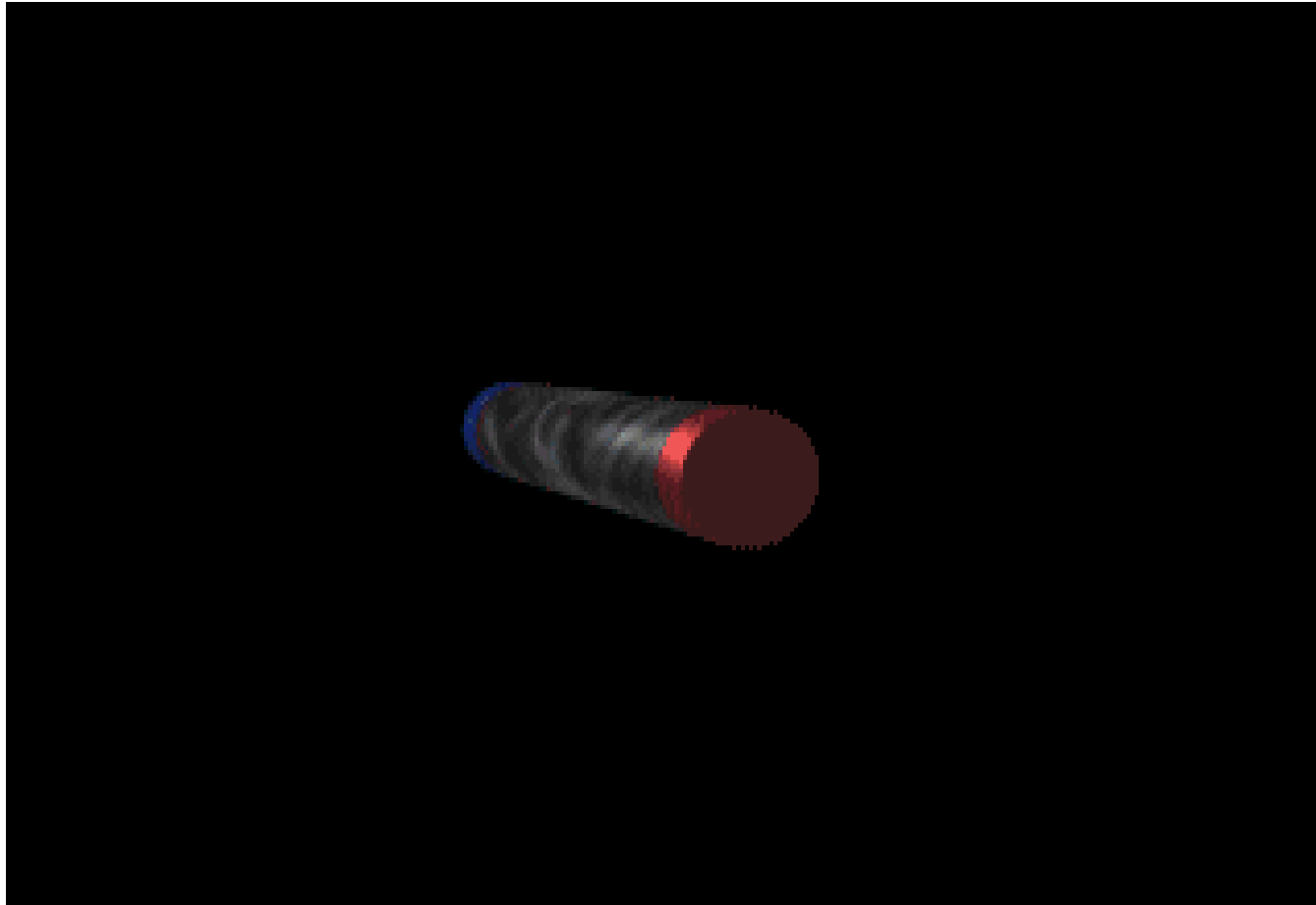




The magnetic flux density is  
the  
Number of flux lines per unit area



$$\frac{\phi}{A} = \frac{\text{webers}}{\text{m}^2}$$



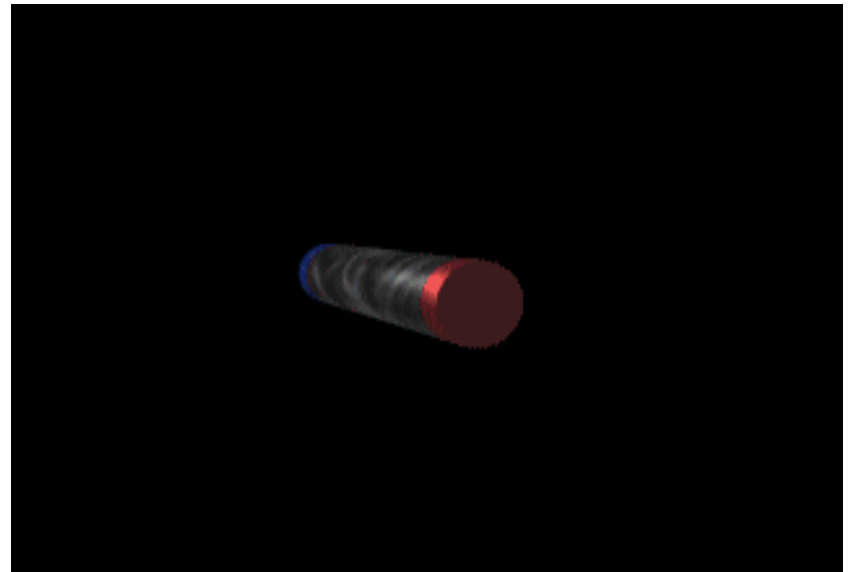
- The magnetic field is produced around the magnet. Picture the number of lines going through any given area: where that is greater,  $B$  is greater

# Magnetic Flux

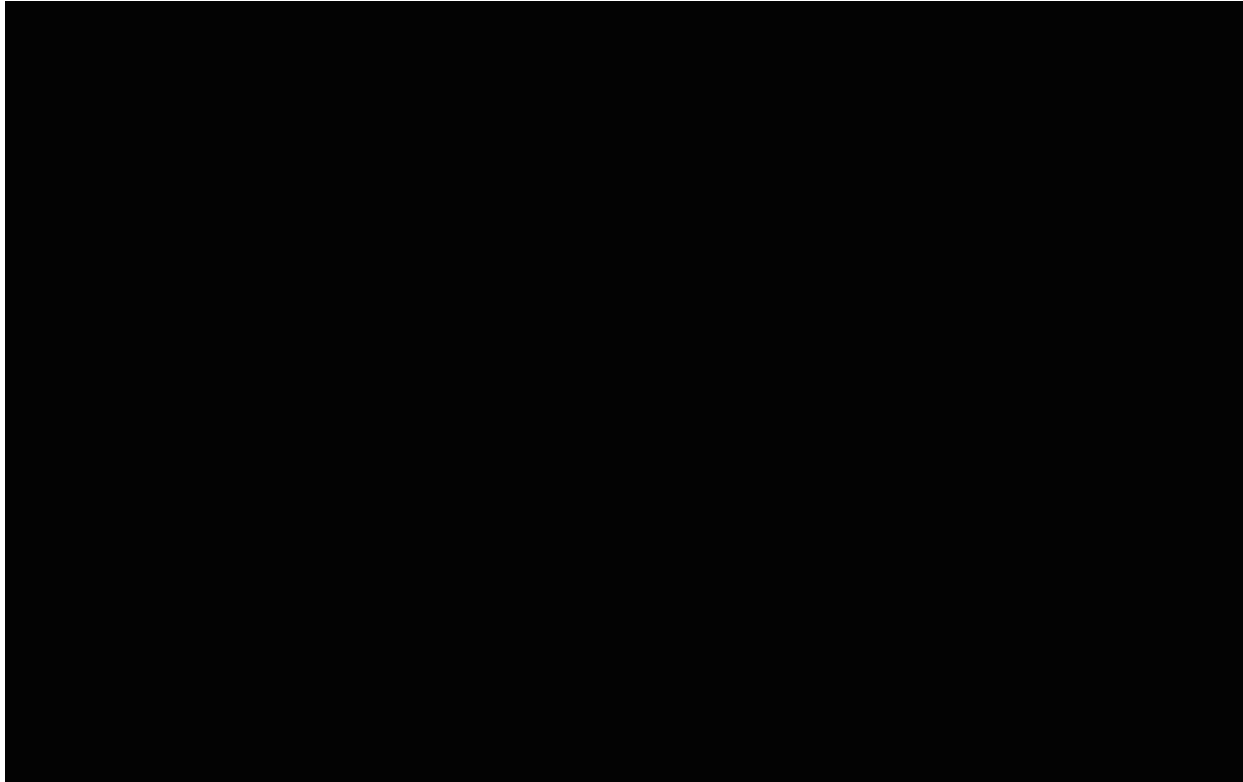
- These are the lines we draw to represent a magnetic field

You can see the flux lines grow, showing the magnetic field.

Magnetic fields are often called  
B-fields



# Magnetic poles



- Note that magnets always come in north, south pairs and never alone (monopoles). Even if we break the magnet in two, each half develops both north and south poles.

# Flux Density and Field Strength

- The denser the flux lines, the stronger the field.
- The unit for measuring the amount of flux lines in an area is called the **weber, Wb**.
- Flux density is measured in webers per meter<sup>2</sup>
- The **tesla, T**, is the SI unit for flux density
- 1 tesla=1 weber/meter<sup>2</sup>